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Patentanmeldung Nr.	Patent application No.	Demande de brevet n°

99109065.5

PRIORITY DOCUMENT
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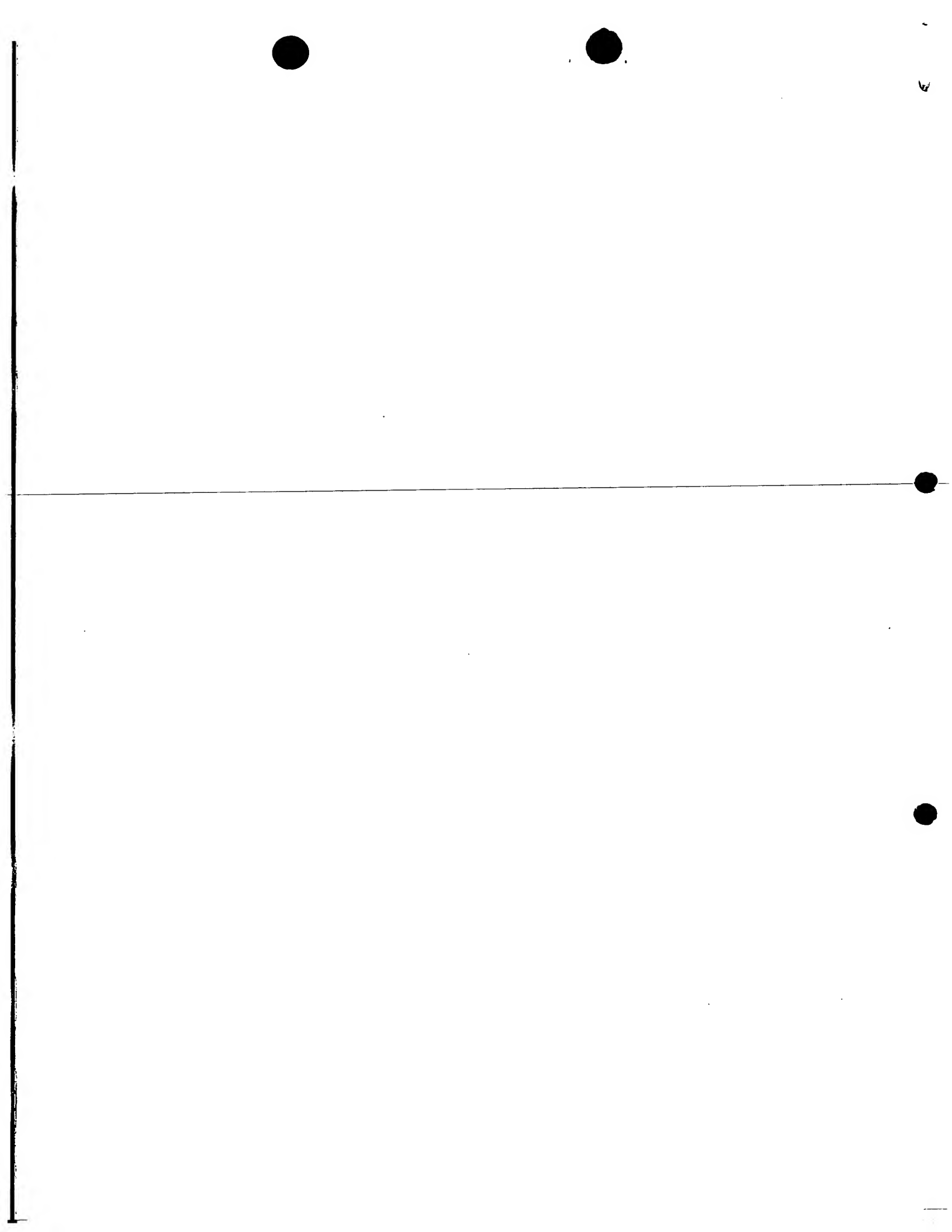COMPLIANCE WITH RULE 17.1(a) OR (b)

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

I.L.C. HATTEN-HECKMAN

DEN HAAG, DEN
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Blatt 2 der Bescheinigung
Sheet 2 of the certificate
Page 2 de l'attestation

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Application no.: **99109065.5**
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Bezeichnung der Erfindung:
Title of the invention:
Titre de l'invention:
Method for marking digital data

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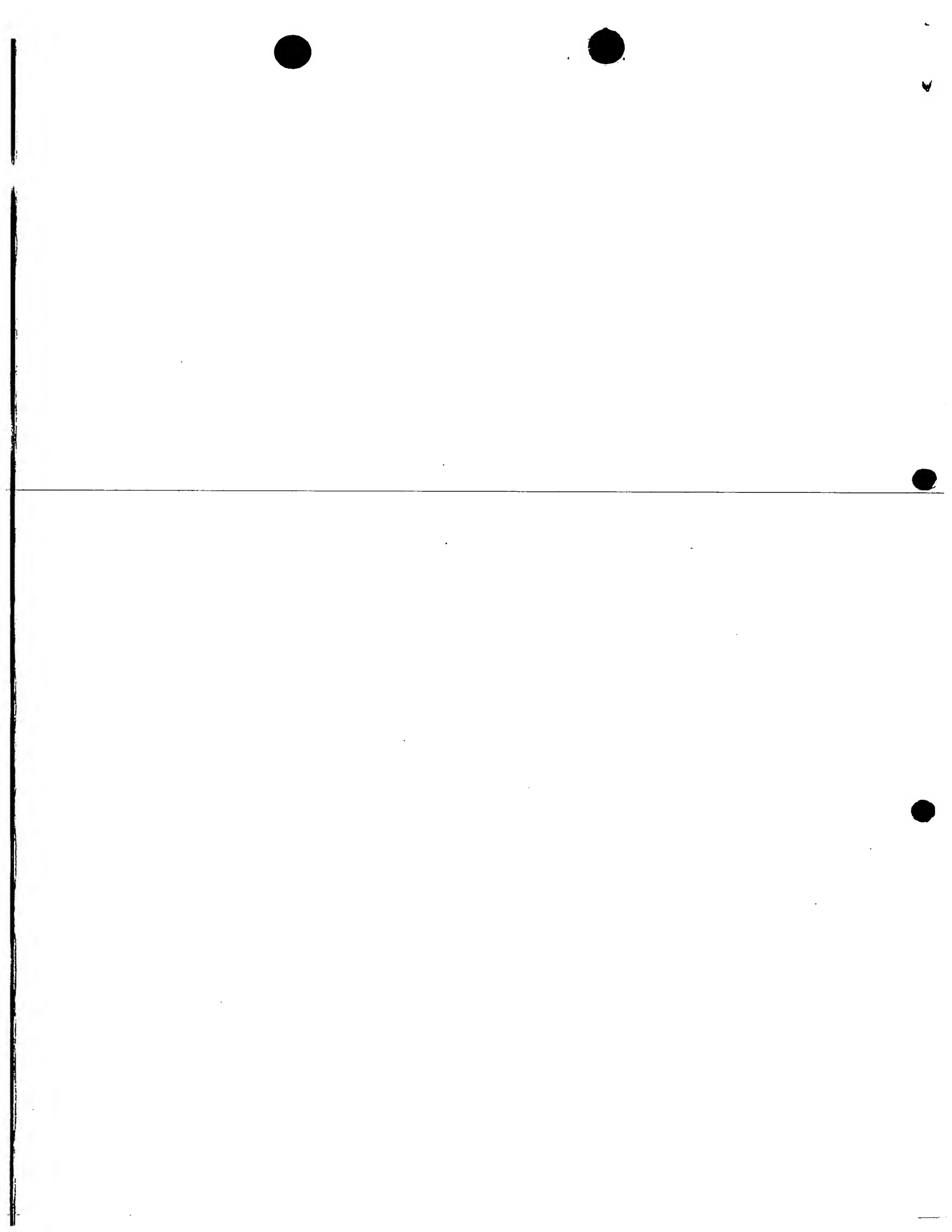
Method for marking digital data.

The invention relates to a method for marking data of a
digital data stream representing video or audio information.

5

Background

In bitstream recording one is free to subdivide the bitstream
into sub-units of more regular structure. Presentation data
10   in DVDs (digital video or versatile disc) is organised into
units called Video Object Unit, denoted VOBU, e.g. in the DVD
Specifications for Video Recording. VOBUs have a variable
size (data amount measured in number of sectors), but have
also a variable duration (measured in number of video
15   fields).

For data retrieval from the disc the DVD Specifications for
Video Recording foresees a 'VOBU map' which is a table where
for every VOBU in a recording the length in sectors and the
20   duration in fields is entered.

Invention

It is one object of the invention to disclose a method for
25   marking digital data as being temporarily erased in such a
way, that on the fly permanent erasure can be achieved
without any additional view into the streams.

According to the invention, this object is achieved by means
30   of the features specified in main claims. Advantageous
designs and developments are specified in subclaims.

The directory and file structure of DVD Stream Recording is
organized in Stream Data and Navigation Data of the DVD
35   Stream Recording as follows:

Any DVD Streamer Device has certain requirements to store its
own, Streamer-specific navigation data on the disc. These
data are solely for helping the retrieval of recorded data;
they need not be understood or even be visible to any outside
5   Application Device.

Any DVD Streamer Device needs to communicate with the
Application Device it is connected to. This communication
should be straightforward, and as universal as possible, so
10   that the maximum possible range of applications - both today
and future - can be connected to the Streamer. The Navigation
Data to support such communication must be understandable by
the Streamer as well as by the Application Device; they will
be called „Common navigation data" in the following.
15

The Streamer Device should offer to the connected Application
Device a means for storing its own private data of any
desired kind. The Streamer needs not to understand any of the
content, internal structure, or meaning of this "Application-
20   specific navigation data".

Navigation data is provided to control the recording, playing
back, and editing of any bitstreams that are recorded. In DVD
Stream Recording, Navigation Data is called "Streamer
25   Information" (STRI). STRI consists of six kinds of
information tables, namely Streamer Video Manager Information
(STR_VMGI), Stream File Information Table (SFIT), Original
Program Chain Information (ORG_PGCI), User Defined Program
Chain Information (UD_PGCI), Text Data Manager (TXT_DT_MG),
30   and Application Private Data Manager (APD_MG).

The Stream File Information Table contains the information
where on the recording media the stream data are recorded.
The Original PGC Information has the function of a play list,
35   which contains all takes which were made. A take is defined
as containing the information between a start and a stop

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action in the sequence of recording or also called one
program of the ORG_PGCI. In addition, a Stream Object (SOB)
contains a full take or part of a take. With both tables the
data can be retrieved for playback.

5

The User Defined PGC Information contains information, which
are defined by a user.

In order to address more precisely a program contains one or
10   more cells. A cell points to Stream Object Units (SOBU) and
to each SOBU an Incremental Application Packet Arrival Time
(IAPAT) is assigned.

According to the invention a temporarily erased flag is
15   introduced in order to indicate a cell to be temporarily
erased. In addition necessary time stamps are set in a
special way to enable on the fly permanent erasure without
any additional view into the streams or quick permanent
erasure. Advantageously the temporarily erasure can be
20   withdrawn completely also.

For a permanent erasure of temporarily erased (TE) cells an
adaptation of Stream Cell Start Application Packet Arrival
Time (SC_S_APAT) and Stream Cell End Application Packet
25   Arrival Time (SC_E_APAT) is needed. In order to realize this
during recording a calculation must be performed without any
additional views into the stream. This will be realized by
following definition of TE cells:
The TE cell covers a part of a SOB. SC_S_APAT and SC_E_APAT
30   of a TE cell are set in a way that only all complete SOBUs,
covered by the TE cell, are marked, i.e.
following rules define SC_S_APAT and SC_E_APAT of a TE cell.
They must be completely fulfilled:

35   SC_S_APAT is equal to the Application Packet Arrival Time
(APAT) of the first application packet of an SOBU and

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if the TE cell covers the start of the SOB, then

SC_S_APAT is equal to the APAT of the first application
packet of the first SOBU of the SOB.

In all other cases

5   SC_S_APAT is equal to or greater than the APAT of the first
application packet of the TE part and

SC_S.APAT is as close as possible to the APAT of the first
application packet of the TE part.

10   SC_E_APAT is equal to the APAT of the first application
packet of an SOBU and

if the TE cell covers the end of the SOB, then

SC_E_APAT is equal to the APAT of the first application
packet of the SOBU following immediately the last SOBU of

15   this SOB.

In all other cases

SC_E_APAT is equal to or less than the APAT of the
application packet which follows immediately the last
application packet of the TE part and

20   SC_E_APAT is as close as possible to the APAT of the last
application packet of the TE part.

Note 1: The definition above assumes that an SOBU exists
after the last SOBU of the SOB. This SOBU doesn't exist

25   really.

Therefore, the following rules define the APAT of the first
application packet of the SOBU following immediately the last
SOBU of this SOB:

this APAT is greater than the APAT of the last application

30   packet of this SOB and

the 18 (= MTU_SHFT) least significant bits of this APAT value
are set to zero and

this APAT value is as close as possible to the last
application packet of the SOB

35

Note 2: TE part means all application packets of an SOB which are not part of the normal cells and which are contiguous on the stream, i.e. no breaks via normal cells. The boundaries of TE parts are normal cells or SOB boundaries. Therefore,

5   each TE part contains one TE cell.

Note 3: SC_E_APAT may be less than SC_S_APAT. The TE part contains complete SOBUs only in the case SC_S_APAT < SC_E_APAT.

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Note 4: For small SOBUs the SC_S_APAT and the SC_E_APAT will be set by the definition above, so that the streamer is able to recognize whether the TE part is only inside one SOBU (SC_S_APAT > SC_E_APAT) or the TE part starts in one SOBU and

15   ends in the following SOBU (SC_S_APAT = SC_E_APAT). Only for the (normal) case, that the TE part covers complete SOBUs SC_S_APAT will be less than SC_E_APAT.

The SCI definition of the ORG_PGCI contains a TE flag inside

20   C_TY (Cell Type) of its SC_GI. This TE flag indicates whether this is an TE cell (TE flag is set) or a normal cell (TE flag is cleared).

Drawings

25

Embodiments of the invention are described with reference to the accompanying drawing, which show in:
Figure 1   TE and Permanent Erasure seen from SOBU level;

30   Exemplary embodiments

Exemplary embodiments of the invention are explained in more detail in the following description.

35   In figure 1 TE and Permanent Erasure seen from SOBU level is shown. In the upper part of the drawing labeled "original

program a program #j contains the cell in which the SC_S_APAT
and one SC_E_APAT. The cell #k contains several SOBUs from
SOBU #1 to SOBU #6. To each SOBU an Incremental Application
Packet Arrival Time (IAPAT) is assigned.

5

In the middle part labeled "after TE" the gray marked part of
program #j is marked for example by a user or based on given
parameter as being temporarily erased. The program #j contain
now 3 cells from cell #k to cell #k+2. Cell #k and cell #k+2

10 can be played back, while on cell #k+1 an erased flag is set.
Cell #k+1 contains a TE part, which was decided to be erased
and a smaller TE cell, which can be used for later recording.

To cell #k a new SC_E_APAT and to cell #k+2 a new SC_S_APAT

15 are assigned. To enable on-the-fly erasure SC_E_APAT
SC_S_APAT for cell #k+1 have to be calculated by the
following rules:

SC_S_APAT is equal to the Application Packet Arrival Time

20 (APAT) of the first application packet of an SOBU and
if the TE cell covers the start of the SOB, then
SC_S_APAT is equal to the APAT of the first application
packet of the first SOBU of the SOB.
In all other cases

25 SC_S_APAT is equal to or greater than the APAT of the first
application packet of the TE part and
SC_S_APAT is as close as possible to the APAT of the first
application packet of the TE part.

30 SC_E_APAT is equal to the APAT of the first application
packet of an SOBU and
if the TE cell covers the end of the SOB, then
SC_E_APAT is equal to the APAT of the first application
packet of the SOBU following immediately the last SOBU of

35 this SOB.
In all other cases

SC_E_APAT is equal to or less than the APAT of the
application packet which follows immediately the last
application packet of the TE part and
SC_E_APAT is as close as possible to the APAT of the last
application packet of the TE part.

The program #j contains now 3 cells from cell #k to cell
#k+2. Cell #k and cell #k+2 can be played back, while on cell
#k+1 an erased flag is set.

In the lower part labeled "after permanent erasure" the
program #j contains only two cells, that are cell #k and cell
#k+1 (former cell #k+2), while the TE cell of the former cell
#k+1 was erased.

The SOBUs of each cell #k and cell #k+1 have been renumbered
and also the assigned IAPATs. As shown in this example a
small area marked in gray remains in the bit stream, which
can not be used for recording of further data.

After permanent erasure the Stream File Information, the
Original PGC Information and the User Defined PGC Information
are updated.

1.   Method for marking data of a digital data stream
representing video or audio information

5   including the following steps:

Stream Cell Start Application Packet Arrival Time
(SC_S_APAT) is equal to an Application Packet Arrival
Time (APAT) of the first application packet of a Stream
Object Unit (SOBU) and

10   if the temporarily erased cell (cell #k+1) covers the
start of the Stream Object (SOB), then
Stream Cell Start Application Packet Arrival Time
(SC_S_APAT) is equal to the Application Packet Arrival
Time (APAT) of the first application packet of the first

15   Stream Object Unit (SOBU) of the Stream Object (SOB);
if the temporarily erased cell (cell #k+1) does not
cover the start of the Stream Object (SOB), then Stream
Cell Start Application Packet Arrival Time (SC_S_APAT)
is equal to or greater than the Application Packet

20   Arrival Time (APAT) of first application packet of the
temporarily erased cell (cell #k+1) and
Stream Cell Start Application Packet Arrival Time
(SC_S_APAT) is as close as possible to the Application
Packet Arrival Time (APAT) of the first application

25   packet of the temporarily erased cell (cell #k+1);
Stream Cell End Application Packet Arrival Time
(SC_E_APAT) is equal to the Application Packet Arrival
Time (APAT) of the first application packet of a Stream
Object Unit (SOBU) and

30   if the temporarily erased cell (cell #k+1) covers the
end of the Stream Object (SOB), then
Stream Cell End Application Packet Arrival Time
(SC_E_APAT) is equal to the Application Packet Arrival
Time (APAT) of the first application packet of the

35   Stream Object Unit (SOBU) following immediately the last
Stream Object Unit (SOBU) of this Stream Object (SOB);

if the temporarily erased cell (cell #k+1) does not
cover the end of the stream object (EOE), then
Stream Cell End Application Packet Arrival Time
(SC_E_APAT) is equal to or less than the Application
Packet Arrival Time (APAT) of the application packet
which follows immediately the last application packet of
the temporarily erased cell (cell #k+1)and
Stream Cell End Application Packet Arrival Time
(SC_E_APAT) is as close as possible to the Application
Packet Arrival Time (APAT) of the last application
packet of the temporarily erased cell (cell #k+1).

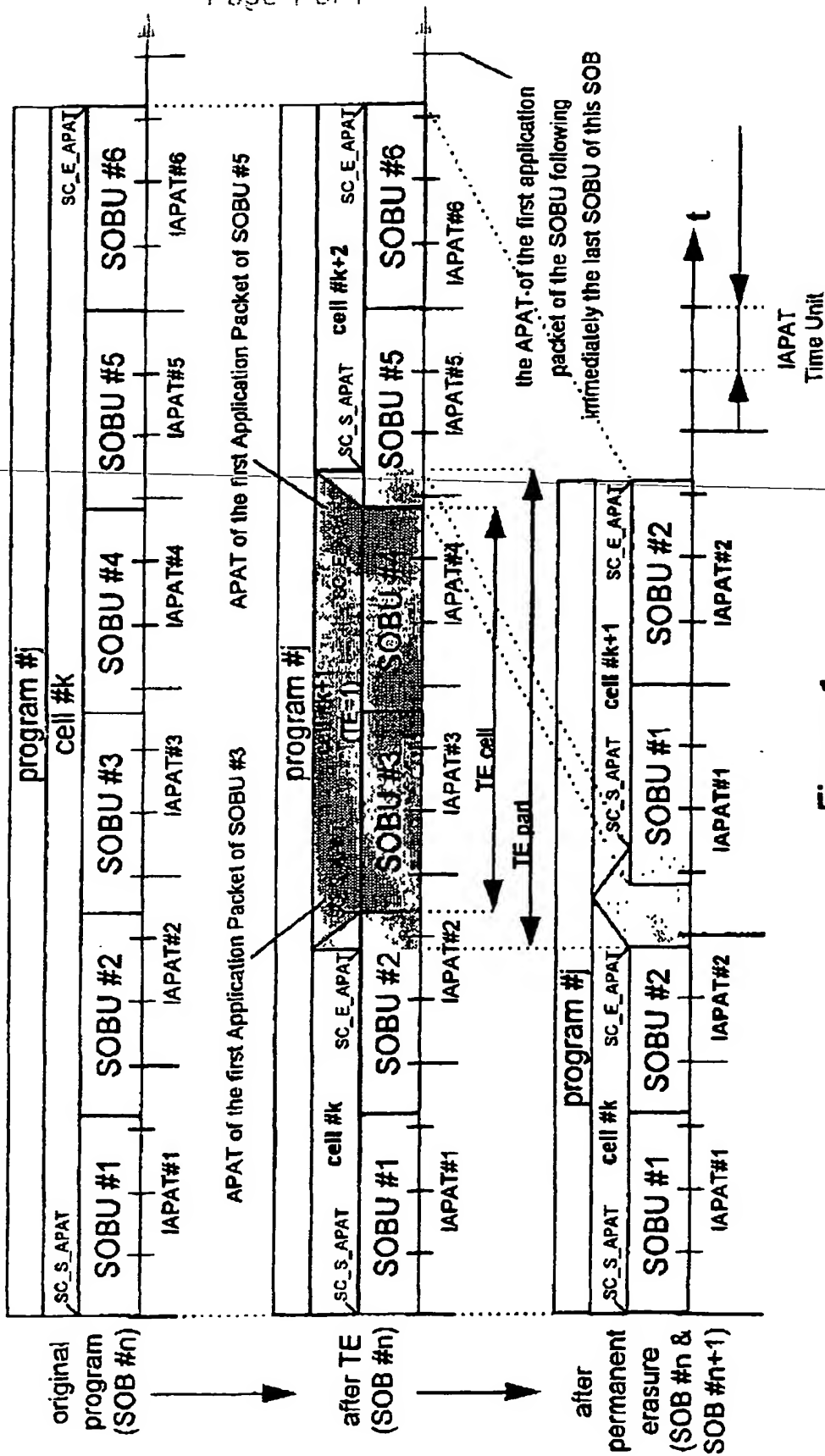Figure 1

10

Abstract

According to the invention a method is proposed introducing a
temporarily erased flag in order to indicate a cell to be

5   temporarily erased. In addition necessary time stamps are set
for complete Stream Object Unit (SOBU) to be erasable to
enable on the fly permanent erasure without any additional
view into the streams or quick permanent erasure.
Advantageously the temporarily erasure can be withdrawn

10   completely also.